Jan. 24, 1928.

1,657,237

H. F. TALBOT

PRINTING LUMINOUS DIALS

Filed Nov. 18, 1926

Fig. 1.

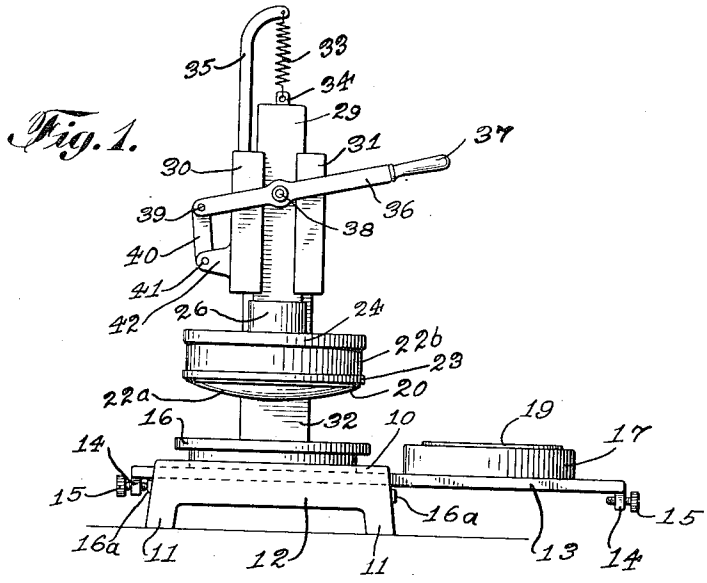


Fig. 2.

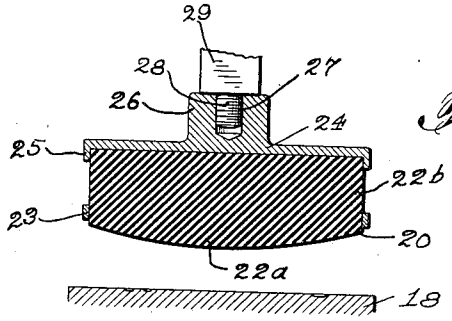


Fig. 3.

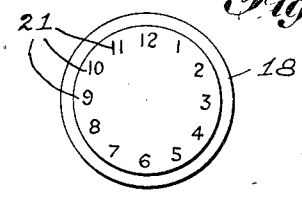
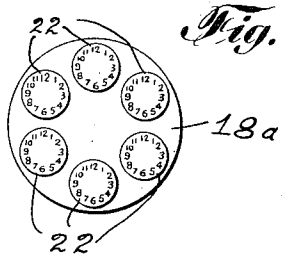


Fig. 4.



INVENTOR

Harrie F. Talbot

BY

H. E. Manning

ATTORNEY

Patented Jan. 24, 1928.

1,657,237

UNITED STATES PATENT OFFICE.

HARRIE F. TALBOT, OF THOMASTON, CONNECTICUT, ASSIGNOR TO WESTERN CLOCK COMPANY, OF LA SALLE, ILLINOIS, A CORPORATION OF ILLINOIS.

PRINTING LUMINOUS DIALS.

Application filed November 18, 1926. Serial No. 149,15

This invention relates to luminous dials, and more particularly to an apparatus and process for simultaneously printing a plurality of letters of radium luminous material upon metal or enamel dials or other surfaces.

One object of this invention is to provide an apparatus of the above nature having a flexible transfer printing pad which is adapted to receive figures of radium luminous paint from a die, and thereafter to print said figures upon a dial or other surface.

A further object is to provide a device of this nature which will be simple in construction, inexpensive to manufacture, easy to install and manipulate, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view there has been illustrated on the accompanying drawing one form in which the invention may be conveniently embodied in practice.

Figure 1 represents a front view in elevation of the dial printing apparatus.

Fig. 2 is a cross-sectional view of the transfer pad and its holder, shown in position above the die.

Fig. 3 is a plan view of a die having luminous figures for a single clock face.

Fig. 4 is a plan view of a die having luminous figures or characters to be simultaneously printed upon a plurality of dial faces.

In the manufacture of luminous dials it has been customary in the past to paint the luminous figures or characters with a brush by hand labor. This operation was found to be hazardous to the operators due to the injurious ingredients, such as phosphorus or radium, contained in the luminous paint. Attempts have been made to avoid this danger by devising machines which would mechanically print the radium luminous letters on dials and other similar surfaces, but these machines hitherto have proven unsuccessful owing to the fact that the radium paint employed would not adhere properly to the surface being printed. Moreover, the non-luminous materials of the paint composition destroyed to some extent the luminous qualities thereof. Another cause for the failure of these attempts was that the paints employed, owing to the large percentage of lacquer contained therein, dried too quickly to enable them to be used for a mechanical transfer process.

By means of the present invention, the above and other disadvantages have been avoided. This has been accomplished by providing an improved composition of radium luminous paint which will possess its full luminous qualities, and will not dry too quickly. The invention also involves an improved process for applying said paint, and an approved apparatus for mechanically printing the figures of said paint upon a dial. One example of improved luminous paint embodying the present invention may be prepared as follows:

Ten parts of varnish, such as copal, are mixed thoroughly with ten parts of Venice turpentine, and three parts of balsam of Copaiva. To the above mixture, radium luminous material, such as that known in the trade as "Undark Grade—E" and containing substantial percentages of radium chloride or other radium salt and zinc sulphide is added. The whole mass is then kneaded until it attains the consistency of soft putty. Ordinarily this consistency of the mass will be attained when an amount of radium luminous material has been added equal to about two-thirds of the entire bulk. The putty-like mass will then be thinned down, preferably with three parts of lavender oil, although thyme oil may be substituted in its place if desired.

The metal or enamel dial is first prepared for the printing process by coating it with black lacquer of standard composition, consisting for example of a solution of gun cotton in amylacetate, which is then allowed to dry thoroughly. The next step is to apply to the black lacquer surface under the positions of the figures of the dial, a foundation coat of metallic oxide paint, preferably a paint known as "flake-white", although an aluminum bronze paint may also be used. This foundation coat is allowed to stand until it becomes "tacky", which generally requires about three-quarters of an hour. The figures of radium luminous paint of the above described composition are then applied to the dial by means of a printing pad constructed as hereinafter specified. The coat of luminous paint is then allowed to dry until it becomes "tacky". If desired, a second coat of radium paint may be printed

over the first to increase the luminous effect thereof. If it is desired to still further enhance the luminosity, a light coat of dry luminous material may be dusted over the figures, as by a fine brush, the material not adhering to the radium paint being brushed off. Finally, the entire dial is covered with a light coat of transparent lacquer.

In carrying out this process it is very important that the foundation surface of metallic oxide paint be allowed to dry until "tacky", as otherwise the figures of radium paint will not properly adhere thereto. In other words, the balance of adhesion between the die, the pad, and the dial must be exactly correct. This balance is accomplished by timing the steps of the process carefully according to the temperature and particular paint mixtures being used.

In applying the radium luminous paint to the figures of the dial, the paint mixture, prepared as described above, is first rubbed into the depressions of the die, as with a putty knife, and the surface scraped off clean. The printing pad is then caused to descend upon the die after the proper time interval, and by adhesion, gathers the material out of the die depressions. The pad 20 is then raised and the bed plate 13 of the apparatus is moved to the left, as viewed in Fig. 1, to bring the dial or other surface to be printed directly underneath and in alinement with the pad 20. The pad is then forced downwardly into contact with the dial 19, thereby printing the figures thereon.

The apparatus employed for carrying out the above process will now be described. This apparatus comprises a base 10 substantially rectangular in form, said base having legs 11 at its four corners for supporting it upon a table or other surface. The base 10 is provided with downwardly extending flanges 12 on its sides and ends, the end flanges being provided with slots to receive and guide a sliding bed plate 13. The bed plate 13 has down-turned ends 14 which are adapted to carry stop screws 15 which engage stops 16^a on the end flanges 12 of the base.

The bed plate 13 is provided on its upper face with a pair of holders 16 and 17 for a die 18 and dial 19 respectively. When the bed plate 13 is in the extreme right-hand position shown in Fig. 1, the die-holder 16 will be directly under and in alinement with a transfer pad 20. When, however, the bed plate 13 is in its extreme left-hand position, the dial-holder 17 will be in alinement with the pad 20 so that when the latter next descends, the luminous paint figures on the pad will be transferred or printed on the dial 19.

In the form of die 18 shown in Fig. 3, a plurality of depressed figures 21 are provided representing a single clock face, the depressions in said figures being adapted to receive the radium luminous paint applied to the die, as described above. In the form of die 18^a shown in Fig. 4, a plurality of smaller depressed figures are provided representing six watch faces 22. In the use of either form of die, however, it will be understood that a plurality of figures will be painted with each stroke of the pad 20.

The tranfer pad 20 is preferably constructed from ordinary printer's roll made from gelatin composition, but said pad may be composed of rubber or any other suitable material if desired. The bottom surface 22^a of the pad is preferably made spherical while the upper part 22^b of the pad is cylindrical. In order to prevent the pad 20 from spreading or bulging when pressure is applied thereto during the printing operation, a ring member 23 is tightly fitted around the cylindrical portion 22^b of the pad just above the spherical portion 22^a thereof.

The pad 20 is carried by a flat cup-shaped holder 24, said holder being provided with a depending annular flange 25 and an upwardly extending neck 26. The neck 26 is made hollow and the interior surface thereof is threaded at 27 to receive a similarly threaded spindle 28 depending from the lower end of a rectangular plunger 29.

The plunger 29 is adapted to be guided by a pair of jaws 30 and 31, said jaws being secured at their rear ends to a curved post 32 mounted upon the base 10 of the apparatus.

The plunger 29 is normally held in raised position by means of a spiral spring 33 attached at its lower end to an eye member 34 on the top of the plunger, said spring being secured at its upper end to a spring holding arm 35, the lower end of which is attached to the jaw 30 previously mentioned.

In order to enable the plunger 29 to be manually moved up and down whenever desired, provision is made of a lever member 36 having a handle 37, said lever being pivoted on a pin 38 carried by the central part of the plunger 29. The opposite end of the lever 36 from the handle 37 is connected at 39 to a downwardly extending link 40, said link being pivoted at its lower end upon a pin 41 rigidly mounted in a lug 42 projecting laterally from the jaw member 31.

In operation, when it is desired to print a plurality of figures with either of the dies shown in Figs. 3 and 4, the proper die 18 or 18^a is first placed in the die-holder 16. The operator will fill the depressions 21 of said die with the radium luminous paint by means of a putty knife. The surface will then be scraped off carefully. The dial 19 upon which the figures are to be printed is then placed in the holder 17 and the die 18 is

placed in the holder 16, and said holders are fastened in the bed plate 13. The die is then rubbed over with the metal oxide paint, whereupon the operator will grasp the handle 37 and push the plunger 29 to move it down from the position shown in Figs. 1 and 2 until the pad 20 comes into complete contact with the die 18. This operation causes the pad 20 to flatten so that when the plunger 29 is raised, the pad 20 will remove by adhesion the paint from the die depressions.

The bed plate 13 will then be slid to its other extreme position in the base 10, at which time the dial 19 will be in exact vertical alinement with the pad 20. The operator will then force the pad down again, printing the foundation coat upon the dial. This foundation coat is then allowed to dry until it becomes sufficiently "tacky"—generally about three-quarters of an hour. The same operation is then repeated for printing the coat of radium paint upon the dial figures. If it is desired to put on a second coat of radium paint, the first coat will be allowed to stand until it becomes sufficiently "tacky" (about three-quarters of an hour) to cause the second coat to strongly adhere thereto. In any case a light final coat of transparent lacquer will be applied to the entire surface of the dial.

One advantage of the present invention is that by the simultaneous printing of a plurality of figures, it is possible to speed up the application of radium luminous paint to dials to a very great extent.

A further advantage is that waste of the expensive luminous material is reduced and the quantity of such material applied to the figures on the dial will be absolutely uniform.

A further advantage of this invention is that it permits dials to be printed rapidly and accurately with less skilled labor.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. The process of printing figures of radium luminous paint upon a dial or other surface, comprising applying a base coat of lacquer to said dial, applying a foundation coat of metallic oxide paint for said figures, allowing said paint to dry until tacky, applying to the figures a coat of radium luminous paint, allowing said radium luminous paint to dry until tacky, applying a second coat of radium luminous paint to said figures, and applying a finishing coat of lacquer to the entire surface of the dial.

2. The process of printing figures of radium luminous paint upon a dial or other surface, comprising applying a base coat to said dial, applying a foundation coat of paint for said figures, allowing said paint to dry until tacky, applying to the figures a coat of radium luminous paint, allowing said radium luminous paint to dry until tacky, applying a second coat of radium luminous paint to said figures, and applying a finishing coat to the entire surface of the dial.

3. The process of printing luminous figures upon a dial, comprising applying a foundation coat of metallic oxide paint to said dial, allowing said foundation coat to dry until tacky, applying a coat of radium luminous paint to said foundation coat, and applying a finishing coat upon said radium luminous paint.

4. The process of printing luminous figures upon a dial, comprising mechanically applying a coat of radium luminous paint simultaneously to a plurality of figures upon said dial, and applying a finishing coat to protect said radium luminous paint.

In testimony whereof, I have affixed my signature to this specification.

HARRIE F. TALBOT.